AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of the claims and all prior listings of the claims in the present application.

1. (currently amended) A method of updating a tap coefficient of a channel equalizer, comprising:

determining whether or not an error of the channel equalizer converges within a range of a threshold of visibility; and

updating the tap coefficient of the channel equalizer using a least-mean-square (LMS) algorithm embodied in a circuit for performing the LMS algorithm:

when [[if]] the error converges within the range of the threshold of visibility; or

when [[if]] the error does not converge within the range of the threshold of visibility and a control signal is in a first state; or

updating the tap coefficient of the channel equalizer using a Kalman algorithm embodied in a circuit for performing the Kalman algorithm:

when [[if]] the error does not converge within the range of the threshold of visibility and the control signal is in a second state;

wherein the circuit for performing the LMS algorithm is part of the circuit for performing the Kalman algorithm.

2. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 1, wherein[[:]] determining whether or not an error of the channel equalizer converges within a range of a threshold of visibility includes:

determining whether a square of the error of the channel equalizer is smaller or larger than the threshold of visibility.

3. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 1, wherein[[:]] the second state of the control signal is a training signal.

4. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 3, wherein[[:]] the error is a difference between the training signal and a signal output from the channel equalizer.

5. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 1, wherein[[:]] the error is a difference between a channel equalizer output signal and a determination circuit output signal, and

wherein the determination circuit output signal has a certain value corresponding to the channel equalizer output signal.

6. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 1, wherein[[:]] when the tap coefficient of the channel equalizer is updated using the LMS algorithm, the tap coefficient is updated with the following equation:

$$c(n) = c(n-1) + \mu e(n)y(n)$$

~~and further~~ wherein *c(n)* denotes an updated tap coefficient vector of the channel equalizer,

wherein *c(n-1)* denotes a tap coefficient vector of the channel equalizer ~~that will be~~ updated to obtain *c(n)*,

wherein μ denotes a step size,

wherein *e(n)* denotes [[an]] the error of the channel equalizer, and

wherein *y(n)* denotes data input to the channel equalizer.

7. (currently amended) [[A]] The method of ~~updating a tap coefficient of a channel equalizer according to~~ claim 1, wherein[[:]] when the tap coefficient of the channel equalizer is updated using the Kalman algorithm, the tap coefficient is updated with the following equation:

$$c(n) = c(n-1) + K(n)e(n)$$

~~and further~~ wherein *c(n)* denotes an updated tap coefficient vector of the channel equalizer,

wherein *c(n-1)* denotes a tap coefficient vector of the channel equalizer updated to obtain *c(n)*,

wherein *K(n)* denotes a Kalman gain vector, and

wherein *e(n)* denotes [[an]] the error of the channel equalizer.

8. (currently amended) A circuit for updating a tap coefficient of a channel equalizer, comprising:

a convergence examining and comparing (CEC) unit arranged and configured to determine if an ~~received~~ error of the channel equalizer converges within a range of a threshold of visibility;

a decoder arranged and configured to receive a control signal and an output signal of the CEC unit and to produce a decoder output signal; and

an updating circuit arranged and configured to update the tap coefficient of the channel equalizer;

wherein the updating circuit updates the tap coefficient using a least-mean-square (LMS) algorithm when the error converges within the range of the threshold of visibility or when the error does not converge within the range of the threshold of visibility and ~~a control~~ the decoder output signal is in a first state, and

wherein the updating circuit updates the tap coefficient using a Kalman algorithm when the error does not converge within the range of the threshold of visibility and the ~~control~~ decoder output signal is in a second state.

9. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 8, wherein[[:]] the updating circuit updates the tap coefficient of the channel equalizer using the Kalman algorithm only when the second state of the ~~control~~ decoder output signal is a training signal.

10. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 8, wherein[[:]] the updating circuit is arranged and configured to

update the tap coefficient of the channel equalizer using the LMS algorithm ~~by executing an~~ with the following equation:

$$c(n) = c(n-1) + \mu e(n)y(n)$$

wherein $c(n)$ denotes an updated tap coefficient vector of the channel equalizer,

wherein $c(n-1)$ denotes a tap coefficient vector of the channel equalizer updated to obtain $c(n)$,

wherein μ denotes [[the]] a step size,

wherein $e(n)$ denotes [[an]] the error of the channel equalizer, and

wherein $y(n)$ denotes data input to the channel equalizer.

11. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 8, wherein[[:]] the updating circuit is arranged and configured to update the tap coefficient of the channel equalizer using the Kalman algorithm ~~by executing an~~ with the following equation:

$$c(n) = c(n-1) + K(n)e(n)$$

wherein $c(n)$ denotes an updated tap coefficient vector of the channel equalizer,

wherein $c(n-1)$ denotes a tap coefficient vector of the channel equalizer ~~that will be~~ updated to obtain $c(n)$,

wherein $K(n)$ denotes a Kalman gain vector, and

wherein *e(n)* denotes [[an]] the error of the channel equalizer.

12. (currently amended) A circuit for updating a tap coefficient of a channel equalizer, comprising:

the [[a]] channel equalizer arranged and configured to produce a channel equalizer output signal;

a slicer arranged and configured to determine a certain value corresponding to the channel equalizer output signal and to generate a slicer output signal corresponding to the certain value;

a selection circuit arranged and configured to receive a control signal, the slicer output signal, and a training signal, and, in response to the control signal, to output the slicer output signal or the training signal as a selection circuit output signal;

a subtracter arranged and configured to subtract the channel equalizer output signal from the selection circuit output signal and to generate an error output signal;

a convergence examining and comparing (CEC) unit arranged and configured to compare a range of [[the]] a threshold of visibility with the error output signal and to generate a first CEC output signal when the error output signal converges within the range of the threshold of visibility or a second CEC output signal when the error output signal does not converge within the range of the threshold of visibility;

a decoder arranged and configured to receive the control signal and the output signal of the CEC unit and to produce a decoder output signal; and

an updating circuit arranged and configured to update the tap coefficient of the channel equalizer in response to the decoder output signal[[,]];

wherein the updating circuit updates the tap coefficient of the channel equalizer:

using a LMS algorithm when the decoder output signal is in a first state; and

using a Kalman algorithm when the decoder output signal is in a second state.

13. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 12, wherein[[:]] the decoder output signal ~~output~~ is in the first state when the error output signal converges within [[a]] the range of the threshold of visibility or the control signal is in a [[first]] third state[[;]], and

wherein the decoder output signal ~~output~~ is in the second state when the error output signal does not converge within [[a]] the range of the threshold of visibility and the control signal is in a ~~second~~ fourth state.

14. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 13, wherein[[:]] when the control signal is in the ~~second~~ fourth state, the selection circuit output signal is the training signal.

15. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 12, wherein[[:]] a first portion of the updating circuit is arranged and configured to update the tap coefficient of the channel equalizer using the LMS algorithm ~~by executing an~~ with the following equation:

$$c(n) = c(n-1) + \mu e(n)y(n)$$

and

wherein a second portion of the updating circuit is arranged and configured to update the tap coefficient of the channel equalizer using the Kalman algorithm ~~by executing an~~ with the following equation:

$$c(n) = c(n-1) + K(n)e(n)$$

wherein $c(n)$ denotes an updated tap coefficient vector of the channel equalizer,

wherein $c(n-1)$ denotes a tap coefficient vector of the channel equalizer ~~that will be~~ updated to obtain $c(n)$,

wherein μ denotes [[the]] a step size,

wherein $e(n)$ denotes an error of the channel equalizer,

wherein $y(n)$ denotes data input to the channel equalizer, and

wherein $K(n)$ denotes a Kalman gain vector.

16. (currently amended) A circuit for updating a tap coefficient of a channel equalizer, comprising:

the [[a]] channel equalizer arranged and configured to produce a channel equalizer output signal;

means for generating a determination signal corresponding to a value of the channel equalizer output signal;

means for receiving a control signal, the determination signal, and a training signal and for selectively outputting the determination signal or the training signal;

means for generating an error signal;

means for comparing the error signal to a threshold of visibility and for generating a comparator output signal;

means for receiving the control signal and the comparator output signal and for producing a decoder output signal; and

means for selectively updating the tap coefficient using a least-mean-square (LMS) algorithm or a Kalman algorithm based on ~~a control signal state and a comparator output signal state~~ the decoder output signal.

17. (currently amended) [[A]] The circuit ~~for updating a tap coefficient of a channel equalizer according to~~ of claim 16, wherein[[:]] the means for generating the determination signal is a slicer[[;]],

wherein the means for receiving the control signal, the determination signal, and the training signal is a multiplexer[[;]],

wherein the means for generating the error signal is a subtracter[[;]], and

wherein the means for comparing the error signal to [[a]] the threshold of visibility and for generating the comparator output signal is a convergence examining and comparing unit.